PAIN AND DISTRESS

5.1 Definitions:

Comfort: A state of physiologic and behavioral homeostasis in which the animal has adapted to its environment and shows normal feeding, drinking, and grooming patterns; social interactions; sleep/wake cycles; and reproductive activity (NRC, in press)

Discomfort: A minimal change in an animal's adaptive level or state of homeostasis as a result of changes in its environment or because of biologic, physical, social, or psychologic alterations (NRC, in press)

Stress: The effect produced by external (e.g., physical and environmental) events or internal (e.g., physiologic or psychologic) factors such as pain, anxiety, and fear that are referred to as stressors and that induce an alteration in an animal's homeostatic or adaptive state. (NRC, in press)

Stress is not always damaging to the animal and certain types of mild stress such as the introduction of novel stimuli into the animal's environment and exposure to novel handling methods may be beneficial to the animal by teaching it to adapt to changes which are very likely to occur from time to time.

When the animal is not able to adapt to change in a satisfactory manner the stress becomes a negative factor.

Distress: An inferred aversive state based on a variety of behavioral, physiologic, and psychologic indices of an animal's inability to adapt to the effect of stressors and the attendant stress. (NRC, in press)

Pain: The sensation (perception) resulting from nerve impulses reaching the cerebral cortex via specific neural pathways (nociceptive pathways). (AVMA, 1986)

The term nociceptive is derived from Latin words meaning "hurtful stimulus."

Noxious stimuli damage or destroy tissue or have the potential to do so.

Noxious stimuli initiate nerve impulses by acting on a specific set of receptors called nociceptors.

Nociceptors respond to excessive mechanical, thermal, or chemical stimuli.

Pain is also defined as an unpleasant sensory or emotional experience associated with potential or actual tissue damage. (Mersky, 1986)

5.2 Categories of Pain:

Sensory-Discriminative: Provides information about the intensity, duration, and location of a stimulus causing pain.

Motivational-Affective: Provides information about the severity and quality of a stimulus causing pain.

5.3 Pain Perception:

Range: From pain detection threshold through upper limit of pain tolerance.

Pain detection threshold: That point at which pain is first perceived during noxious stimulation and it is minimal pain, not associated with stress or distress. (Wolff, 1978)

The pain detection threshold is considered to be the same in animals and in humans. (Vierck, 1976; Zimmerman, 1984; Kitchell, 1987)

Pain tolerance: Limit of tolerance to noxious stimuli varies between individuals and between species.

Duration:

Acute pain is characterized by a short duration, it occurs after injury or early in illness, and plays a protective role in warning the body about injury.

Chronic pain is characterized by a longer duration than acute pain and it does not serve protective role with regard to an injury.

The cerebral cortex and subcortical structures must be functional for pain to be perceived; pain is not perceived if these structures are rendered nonfunctional by such means as hypoxia, drugs, electric shock, concussion, or surgical intervention.

An animal can perceive pain even though noxious stimuli do not elicit body movements, for example, if the animal is given a muscle-paralyzing drug such as succinylcholine.

5.4 Assessment of Pain: (AVMA, 1993)

Assessment of pain must be based primarily on observations of abnormal behavioral and physiologic responses that demonstrate anxiety and fear (e.g., distress vocalization, struggling, stumbling, escape activity, defensive aggression or freezing, muscular tremors, pupillary dilation, salivation, reflex urination and defecation, panting and sweating, and tachycardia).

Stimuli that evoke a pain response in a conscious animal might elicit only reflex responses in an unconscious animal; therefore, nonpurposeful movements are not reliable indicators of

pain perception.

5.5 Stressors:

Injury: The effects on state of an animal may be major or minor and they may be partially or completely reversible.

Pain: Can be a major stressor and can lead to distress and maladaptive behaviors.

Anxiety and Fear: Emotional states that are often important stressors.

Anxiety: A generalized, unfocused response to the unknown.

Fear: An emotional state that refers to an experienced or known danger in the immediate environment.

5.6 Distress:

The relationship between the presence of stress and the process by which an animal proceeds from a state of comfort or discomfort to one of distress poses the same questions that arise whenever one attempts to relate physiologic processes to subjective experience.

Response to Short-Term Stress: The animal attempts to adapt behaviorally and\or physiologically and usually there are no long-term effects.

Response to Prolonged Stress:

Maladaptive behaviors can include abnormal feeding and postprandial grooming, inappropriate interaction with cohorts or handlers (e.g., aggression, passivity, withdrawal), and inefficient reproduction.

If the animal continues to attempt to adapt the maladaptive behavior may become a permanent part of the animal's behavioral repertoire. The behavior tends to become more maladaptive as the state of distress becomes more extreme or excessive.

Pathologic conditions such as gastric and intestinal lesions, hypertension, and immunosuppression can occur as sequellae to prolonged distress.

5.7 Ethical Obligations:

Principle of Nonmaleficence: Cause no unnecessary pain or distress.

Principle of Beneficence: Be kind whenever possible.

Procedures selected in designing a study should be based on predictibility of outcome.

To predict outcomes, use as comparisons examples with documented characteristics related to the presence or absence of pain and/or distress. (Ad Hoc Committee on Animal Research, 1988)

5.8 Legal Obligations:

These issues are overseen by the Institutional Animal Care and Use Committee.

Scientific procedures must avoid or minimize discomfort, distress, and pain and be consistent with sound research design as stated in AWRs and the PHS Policy.

Principal investigators must have considered alternatives to procedures that might cause more than momentary or slight pain or distress.

Appropriate sedation, analgesia, or anesthesia must be used for procedures that can cause more than momentary or slight pain or distress to the animals, unless withholding such agents is justified for scientific reasons and those reasons are stated in writing. (AWR 2.31; PHS, 1986)

Potentially painful and distressful procedures must be planned in consultation with the attending veterinarian (AWRs, CFR 2.31)

Neuromuscular blocking agents (paralytics) must not be used without anesthesia. (AWRs 2.31, NRC, 1985; PHS, 1986)

Euthanasia must be performed at the end of a procedure or, if possible, during a procedure in which animals experience severe or chronic pain or distress that cannot be relieved. (AWRs, 2.31; PHS, 1986)

5.9 Adequate Veterinary Care:

Veterinary staff must be able to recognize and advise scientific staff on signs of pain or distress in animals.

Veterinary staff must be familiar with and advise scientific staff on appropriate interventions for relief of pain or distress.

Pharmacologic Interventions:

Chemical interventions vary significantly between species, by dose, and by route of administration.

Analgesics temporarily abolish awareness of pain without loss of consciousness, although their mechanism of action in animals is not yet clearly defined.

Tranquilizers and sedatives can be used to prevent or diminish distress.

Anesthetics block the perception of pain.

Nonpharmacologic Interventions:

Rearrangements in social groupings may alleviate stressful conditions.

The addition of bedding material might increase physical comfort and gentle handling might decrease distress. However, if the animal is not adequately socialized to human contact it will respond negatively to attempts at handling.

It is critically important to adapt the animal to experimental situations before start of study in order to decrease stress.

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